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Evidence-Informed Recommendations for Physical Therapy Practice with Older Adults in the Inpatient Setting

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Abstract

Background: Hospital-acquired deconditioning (HAD) is a common consequence of hospitalization in older adults and is characterized by declines in strength, endurance, mobility, and functional independence resulting from acute illness and reduced physical activity. Traditional inpatient rehabilitation often emphasizes safety and basic mobility; however, these approaches may be delivered at intensities insufficient to reverse physiological decline or optimize recovery.

Purpose: This perspective article provides expert-informed recommendations for physical therapy management of hospitalized older adults experiencing HAD. Low-intensity rehabilitation remains dominant in the inpatient setting, despite evidence of the benefits of high intensity training (HIT). Current evidence, clinical expertise, and principles of geriatric rehabilitation are synthesized to promote evidence-based exercise prescription and implementation in inpatient settings specifically for the older adult.

Literature review: Emerging evidence supports a dose-response relationship between exercise intensity and functional outcomes in older adults, with moderate- and high-intensity interventions producing greater improvements in strength, gait speed, and functional independence than low-intensity approaches.

Recommendation: Multicomponent exercise programs incorporating resistance, balance, endurance, and mobility training have demonstrated effectiveness in mitigating hospitalizationassociated decline, including among frail older adults. Attention to prescribing exercise at the optimal intensity and frequency is critical to avoid the detrimental effects of hospitalization, particularly with the older adult. Practical recommendations are presented regarding comprehensive evaluation, individualized exercise prescription, monitoring and documentation of intensity, progression of therapeutic activities, and application of evidence-based dosing parameters.

Limitations to Implementation of HIT: Implementation of high-intensity training in acute care remains challenging due to medical complexity, safety concerns, variability in exercise intensity measurements, and limited standardization of dosing practices.

Conclusions: Exercise intensity is a critical determinant of recovery following hospitalization in older adults. Physical therapists are uniquely positioned to address HAD. Adoption of evidenceinformed rehabilitation strategies that emphasize progressive, appropriately dosed interventions should be adopted to improve functional outcomes for hospitalized older adults.

Key Words: Deconditioning, High Intensity Training, Exercise, Physical Therapy

Introduction

Hospitalization in older adults frequently results in significant functional decline, commonly described as hospital-acquired deconditioning (HAD). Periods of inactivity during hospitalization are associated with rapid declines in both muscle strength and aerobic capacity in older adults, with measurable reductions in strength observed within days and significant impairments in functional performance and endurance following short-term bed rest associated with hospitalization [1]. Emerging evidence indicates that exercise intensity is a critical factor influencing recovery, with moderate- to high-intensity interventions producing greater improvements in strength, physical performance, and functional outcomes compared to low-intensity approaches. Multiple studies demonstrate a clear dose-response relationship with high intensity training yields meaningful gains even in frail or older clients. Structured, multicomponent exercise programs applied at a moderate to high intensity are safe and effective for older adults, including frail populations [2].

Purpose

This perspective article provides expert-informed recommendations for physical therapy practice specifically with the hospitalized older adult, integrating current research, clinical expertise, and principles of geriatric rehabilitation to support evidence-based management of older adult clients in inpatient settings. This article synthesizes current evidence on exercise dosing in older adults and highlights the limitations of traditional low-intensity rehabilitation strategies. The article further outlines practical recommendations for implementing progressive, appropriately dosed interventions in clinical settings. Adoption of high-intensity, evidence-based rehabilitation approaches may improve recovery in older adults and enhance functional independence.

Background

Hospital acquired deconditioning (HAD) is often seen in older adults. Previously known as "post hospital syndrome" HAD better describes the condition. Acute hospitalization includes a variety of activities or experiences which contribute to the client being stressed and less active including: sleep disturbances, long periods of inactivity, and dietary changes. A study examined time out of bed for clients in hospitals and found clients spent 82% of time in bed, 13% of time in a chair while the remaining 4% of time (on average) was spent standing or walking [3]. Excessive time spent in bed or in a chair contributes to loss of strength and function in the older adult.

Literature Review

Evidence indicates muscle mass typically declines 3-5% per decade between the 30-60 years of age increasing to a loss of muscle mass of 3% per year after age 60 [4]. Acute disuse, often seen during hospitalization, accelerates this process, leading to a disproportionate loss in strength and mobility over short periods in particular with the oldest clients. The typical loss of muscle mass places the older adult at increased risk of loss of function during or following hospitalization. Loyd et al., [5] found that approximately 30% experienced a functional decline during or immediately following hospitalization. This interaction between aging, inactivity, and acute illness underscores the need for targeted rehabilitation strategies that directly address physiological decline rather than simply promoting basic mobility.

Functional decline associated with hospitalization in older adults can be mitigated and even reversed through early, structured rehabilitation interventions. A multicenter randomized clinical trial by Martínez-Velilla et al., [6] found that an individualized multicomponent exercise program initiated during acute hospitalization significantly improved functional independence and physical performance compared to usual care, effectively reversing hospitalization-associated decline. The programs examined incorporated resistance training, balance activities, and walking with attention to adequate frequency and intentional progression of intensity. These programs appear to be particularly effective.

A growing body of evidence demonstrates that exercise intensity is a critical determinant of functional recovery in older adults, particularly those with sarcopenia or hospital-associated deconditioning. Multiple studies have investigated and compared the benefits of low, moderate, and high intensity exercise with a range of clients. While many studies indicate most exercise will result in some improvements in strength and/or function, the current evidence indicates the benefits of moderate to high intensity exercise result in the biggest gains related to physical health. Evidence consistently demonstratesa dose–response relationship between exercise intensity and functional outcomes in older adults. Low-intensity interventions appear to produce limited benefits, primarily affecting isolated measures such as grip strength, with minimal impact on broader functional performance [7]. In contrast, Chen and colleagues reported moderate-intensity training is associated with improvements across more domains, including lower extremity strength, mobility, and functional capacity. High-intensity resistance training yields the greatest improvements, particularly in gait speed, muscle mass, and overall physical performance, suggesting that intensity is a key driver of clinically meaningful recovery.

Findings from Baltasar-Fernandez et al. [8] are consistent with broader evidence related to healthy older adults, demonstrating that frail older adults respond positively to high-intensity training, with improvements in both physical function and frailty status. These results are further reinforced from Marshall-McKenna et al. [2], who reported that progressive resistance training is both safe and effective in medically complex populations, reinforcing the feasibility of high-intensity training in this group. Finally, when addressing the benefits of high intensity training to the frail and hospitalized populations, evidence suggests high intensity interventions when appropriately supervised do result in improved outcomes, affirming similar principles can be applied in acute care settings to mitigate hospital-associated decline [9]. Supporting this, dose–response analyses of in-hospital multicomponent exercise programs indicate that increased exposure to exercise is associated with greater improvements in physical function, gait speed, and strength. In addition, a recent randomized trial examining high-intensity, progressive rehabilitation programs further demonstrate that such interventions are effective and practical in improving physical performance, though often do not outperform well-structured usual care, suggesting that overall exercise dose and program quality may be as influential as intensity alone [10, 11]. Collectively, these findings highlight that while high-intensity or higher-dose exercise is a key component of recovery, optimizing the delivery, progression, and consistency of rehabilitation may be equally critical. These findings have important implications for exercise intensity, as the principles underlying successful interventions—progressive overload, repetition to fatigue, and task-specific challenge—are inherently aligned with moderate-to high-intensity training paradigms. Consequently, low-intensity approaches that do not meet physiologic thresholds for adaptation are unlikely to reverse deconditioning, whereas appropriately dosed, high-intensity interventions may be necessary to achieve meaningful improvements in strength, mobility, and independence in this population.

The American Physical Therapy Association's Academy of Geriatric Physical Therapy concurs recommending older adults engage in "high intensity exercise whenever possible for strength, balance, endurance and functional training" [12]. The recommendations further support the need for appropriate dosing and challenge levels for physical activity to promote positive change in older adults.

Overall, evidence indicates exercise intensity is a primary determinant of functional recovery, with low-intensity interventions insufficient to reverse strength loss, while moderateto- high intensity programs provide meaningful improvements in mobility and independence.

See Flow Chart 1 below which illustrates physiological response to exercise intensity

Flow Chart 1: Physiological Adaptation & Functional Outcomes based on Exercise Intensity [20]

Physiological Adaptation Low Intensity
- Maintains mobility
- Improves circulation
- Promotes activity participation

Moderate Intensity
- Increased muscle strength
- Improved balance and endurance
- Enhanced gait and mobility

High Intensity
- Greater strength and power gains
- Improved physical performance
- Enhanced reserve capacity

⇩

Functional Outcomes related to increased physiological adaptation
- Improved Gait Speed
- Increased Transfer independence
- Decreased Fall Risk
- Increased Independence in ADLs
- Improved Quality of Life

Defining Exercise Intensity

American College of Sports Medicine [13] 2022 guidelines for low, moderate and high intensity exercise are applicable to the older adult. Exercise intensity in older adults is commonly defined using relative physiological measures such as percentage of maximum heart rate, metabolic equivalents (METs), rating of perceived exertion (RPE), the "talk test" [14] as well as percentage of one-repetition maximum (%1RM) for resistance training. Low intensity strengthening exercise is generally considered to be at < 50% 1RM, typically the client can complete greater than 15 repetitions. Low intensity aerobic exercise is < 64% Maximum heart rate (MHR) < 3 METs with a rated perceived exertion (RPE) of 0-3 on a 0-10 scale [13], typically the client is able to carry on a routine conversation during low intensity exercise [14]. Moderate intensity aerobic exercise corresponds to approximately 64-76% maximum heart rate, 60-80% of 1 rep maximum which equates to 8-15 repetitions before fatigue or an RPE of 5-6 on a 10-point scale. Mild breathlessness will be observed during moderate intensity exercise. Vigorous/high intensity exercise or activity ranges from 77-95% MHR or an RPE of 7-8 out of 10. High intensity strength training involves loads ≥80% 1 RM which is typically 1-8 repetitions prior to fatigue [13]. Clients working at a high intensity will have limited ability to speak during this type of exercise. For the frail, older adult, testing for 1 Repetition Maximum (RM) is not recommended. Older adults can tolerate working at intensity levels of 70-80% of 1 RM which typically equates to the client completing 6-8 repetitions [15]. RPE provides critical information to monitor intensity. ACSM guidelines for low, moderate and high intensity exercise are applicable to the older adult, though may need some modification when applied to the hospitalized older adult. However, recognizing and documenting intensity level is critical in order to apply a progressive evidence-based plan of care for older clients.

Intensity Level	Aerobic Exercise	Resistance Training	RPE (0-10 Scale)	Talk Test / Observable Response
Low Intensity	<64% Maximum Heart Rate (MHR); <3 METs	<50% 1RM; typically >15 repetitions	0-3	Able to carry on a normal conversation comfortably
Moderate Intensity	64-76% MHR	60-80% 1RM; typically, 8-15 repetitions before fatigue	5-6	Mild breathlessness present, but conversation remains possible
Vigorous / High Intensity	77-95% MHR	≥80% 1RM; typically, 1-8 repetitions before fatigue	7-8	Limited ability to speak during exercise due to increased exertion

Table 1: Exercise Intensity Guidelines for Older Adults

Source: American College of Sports Medicine [13]

Consideration	Recommendation
1RM Testing	Direct 1RM testing is generally not recommended due to safety concerns.
Resistance Training Intensity	Frail older adults can often tolerate training at 70-80% of estimated 1RM, typically allowing completion of 6-8 repetitions.
Monitoring Exercise Intensity	Rating of Perceived Exertion (RPE) is a practical and valuable method for monitoring and adjusting exercise intensity.
Clinical Observation	Monitor for excessive fatigue, dyspnea, pain, balance deficits, and prolonged recovery following exercise.

Table 2: Special Considerations for the Frail Older Adult

Sources: American College of Sports Medicine [13]; Kemmis [15]; Kwon [14].

Recommendations for Optimal Physical Therapy for the Older Adult With HAD

Physical therapists have a unique opportunity to assist older clients with HAD in reversing the common effects of prolonged hospitalization and/or immobility. Baseline measures across related impairment levels need to be collected and analyzed. Appropriately designed high intensity therapeutic interventions should be delivered at a frequency consistent with the current evidence with attention to the unique needs of the client including the frail older adult [2, 10, 16, 17].

Critical steps to promote a progressive, evidence-based approach to the evaluation and treatment of the client with HAD include:

1. Completion of a specific holistic evaluation for each client with attention to the client's prior level of function and personal goals. Examination data should include baseline measures of strength, flexibility, endurance, balance, coordination and functional skills specific to transfers and gait [12].
2. Generation of an evidence-based, progressive and adequately intense plan of care to promote change at a physiological level based on overload principles [17]. with careful consideration of comorbidities when designing the program [15].
3. Promotion of exercise at a level of appropriate intensity and frequency while providing the appropriate dose of exercise. Intensity of exercise may be determined via a variety of methods, including Rated Perceived Exertion (RPE) scale by the client [13].
4. Delivering and monitoring the intensity of exercise. Exercise intensity may be monitored by gathering objective and subjective information from exercisers to confirm they are working at appropriate intensity. Information about intensity needs to be confirmed and documented [13] and Shigematsu et al., [18].
5. Modification of intensity for the frailest/deconditioned clients depends on tolerance for activity. Intensity of exercise based on RPE or number of repetitions completed should support documented intensity who cannot tolerate high intensity exercise [19].
6. Application of a variety of therapeutic interventions specific to all fitness areas including strength, flexibility, balance, endurance, as well as functional problem areas related to functional mobility including locomotion [20].
7. Documentation of treatment dose, frequency and intensity for all components of treatment sessions in order to promote a progressive program across time given a variety of physical therapy providers may be engaged in the individual's care [20].

Limitations of High-Intensity Training in Acute Care

Although growing evidence supports the potential benefits of high-intensity training (HIT) rehabilitation interventions, implementation within acute care settings is particularly challenging for frail, medically complex, or hospitalized older adults. Acute illness, multiple comorbidities, physiological instability, fatigue, cognitive impairment, and limited activity tolerance may reduce an individual's capacity to safely participate in HIT. Despite growing interest in exercise-based interventions for hospitalized older adults, the evidence base remains limited by a relatively small number of randomized controlled trials and methodological heterogeneity across studies [21, 22].

Rehabilitation professionals must balance the principles of exercise overload and progression with the need for patient safety, close physiological monitoring, and individualized clinical judgment. Traditional rehabilitation approaches in acute care frequently emphasize safety, early mobility, and discharge readiness through general conditioning activities (GCAs), such as low-intensity ambulation and non-specific exercise programs. While these interventions can support mobility maintenance and reduce immediate risks associated with immobility, they are often delivered at intensities below those necessary to produce meaningful neuromuscular, cardiovascular, or functional adaptations [23]. As a result, exercise dose, intensity, and frequency may be insufficient to improve strength, endurance, balance, and overall functional performance.

Despite increasing interest in HIT for older adults, several barriers limit its widespread application in frail and hospitalized populations. These barriers include concerns regarding patient safety and fall risk, limited standardization of exercise intensity measurement methods for medically complex older adults, variability in provider experience and documentation practices, and a lack of validated outcome measures

specifically designed to quantify exercise intensity in frail individuals with multiple comorbidities. Not all hospitalized older adults can safely tolerate higher exercise intensities at the onset of rehabilitation, necessitating individualized exercise prescription based on functional status, medical complexity, activity tolerance, and patient-centered goals. Some individuals may initially require lowintensity interventions; however, ongoing monitoring and progressive adjustment of exercise dosage should allow advancement to higher intensities as tolerance improves. When appropriately prescribed and progressed, HIT may help prevent further functional decline, enhance physiological reserve, and optimize recovery during and after hospitalization.

Conclusion

Older hospitalized adults are particularly vulnerable to hospital acquired deconditioning. The available evidence indicates that exercise dosing, particularly intensity, is a critical variable influencing outcomes, with insufficient dosing likely contributing to the persistent functional deficits observed following hospitalization. Establishing a culture which supports the delivery of high intensity activities in a safe hospital environment is critical to this progressive approach to treatment of the client with HAD and improving outcomes for older adults. Physical therapists are positioned to lead efforts to provide safe, yet optimally intense therapeutic programs for all clients, especially hospitalized older adults who present with significant deconditioning and dysfunction. Future research is needed to investigate optimal practical tools to measure exercise intensity in older adults. Future research should also compare routine care and high-intensity exercise to evaluate their effectiveness and safety in hospitalized older adults.

Competing Interests

The author declares they have no competing interests.

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